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Paper: Radiological positioning

Qus:1

Basic projections of femur and their radiological finding:

Two projections are taken routinely which includes knee and hip on image. The images required large 35×43 cm CR cassette. A grid may be used that effects scatter are reduced. However an image of only distal aspect of femur be required(AP)then use the grid can remove to reduce patient dose.

1.Anterior _posterior :

Patient position and image receptor:

- The patient lies supine on the X_ray table with both legs extended.
- The effect limb is rotated to centralize patella over the femur.
- Sandbad are placed below knee to maintain position.
- Image receptor is positioned in Bucky tray immediately under limb which is adjacent to the posterior aspect of the thigh to include both the hip and knee joints
- Alternatively, the image receptor is positioned directly under the limb against the posterior aspect of thigh to include knee join.

Direction and location of X_ray Beam:

- The colimated verticle beam Centre to the middle of the image receptor with the vertical centre ray at 90 degree to an imaginary line joining both femoral condyles.

Radiological findings:

- The length of the femur should be visualized.
- The hip and knee joints should be included on the image where possible.
- It may be difficult to obtain additional projection of knee or hip joint required.
- If coverage is not achieved how ever this will be depend on the clinical information required.
- Patella should be centralised to indicate rotation has been minimized.

Additional considerations:

- In suspected fractures , the limb must not be rotated.
- If distal femur is focus of attenuation and effects of scatter nor concern then image receptor can be placed directly under femur.

2. Femur _Lateral:

Position of patient and image receptor:

- From AP position the patient rotates on the affected side, and the knee slightly flexed
- The pelvis is rotated backwards to separate the thighs.
- The position of the limbs is then adjusted to vertically superimpose the femoral condyles.
- Pads are used to support the oppsite limb behind the one being examined.
- The image receptor is positioned in the Bucky tray under the lateral aspect of the thigh to include the knee joint and as much of the femur as possible.
- Alternatively, the image receptor is positioned directly under limb, against the lateral aspect of the thigh ,to include the knee joint.

Direction and location of x_ray:

- The collimation vertical beam is centred to the middle of femoral shaft, with the central ray parallel to imaginary line joining the femoral condyles.

Radiological finding :

- The length of femur should be visualized including the hip and knee joints.
- An additional projection of hip joint using a grid may be required.
- If coverage is not initially achieved or the image quality is affected by scatter in proximal femur.
- However this will depend on the clinical information required and patient size.

Qus:2**Basic x_ray projections of chest and their radiological consideration:****1. Anterior _ posterior (Errect):**

Ap projection is often used as alternative when PA projection cannot performed due to some critical patient position. Patient is supported erect on chair.

Position of patient and image receptor:

- Patient is sits against the image receptor with their back .
- The median sagittal plane is adjusted at right angle to the middle of the image receptor.
- Depending on patient condition , arms are extended forward into anatomical position .
- And internally rotated to minimize the superimposition of the scapulae on lung fields.

Direction and centring of x_ray beam:

- Horizontal ray is directed first at right angle to image receptor and towards the sternal notch.
- Central ray is then angled until it is coincident with the middle field to image receptor.
- Exposure is taken on normal full inspiration.
- An FRD at least 120cm is essential to reduce unequal magnification of intrathoracic structures.

Radiological consideration:

- The image should be of comparable quality to describe for PA chest projection.
- Heart is moved further away from image receptor.
- Thus increasing magnification and reducing accuracy of assessment of heart size.
- Full lung fields with scapulae projection laterally away from the lung fields.
- No rotation thus anterior ribs ends should be equidistant from the spine .

2. Chest_Posterior _anterior:**Patient and Image receptor positions:**

- The patient faces the image receptor with feet slightly apart from stability and chin extended and placed onthe top of image receptor.

- Median sagittal plane is adjusted at right angle to middle of the image receptor.
- The dorsal aspect of hands are placed behind and below the hips.
- Elbow brought forward in contact with image receptor.
- For patient with reduced mobility an alternative is to allow the arms to encircle the image receptor.

Direction and location of x_ray beam:

- The horizontal central beam is directed at right angle to image receptor at level of eight thoracic vertebrae.
- Exposure is made in full normal arrested inspiration.
- An FFD of 180cm should be used to minimize magnification.

Radiological consideration:

- Full lung fields with scapulae projected laterally away from lungs fields and cervical symmetrical and equidistant from the spinous process.
- Sufficient inspiration: visualizing either 10 ribs anteriorly or 10 ribs posteriorly.
- Costophrenic angles, diaphragm, mediastinum, lung markings and heart should be defined sharply.
- An expiration radiograph may be obtained to demonstrate small apical pneumothorax.

3.chest_Lateral:

Position of patient and image receptor:

- This projection may be undertaken with or without grid depending on patient size and local protocols.
- Patient is turned to bring the side under investigation in contact with image receptor.
- The median sagittal plane is adjusted parallel to image receptor.
- Arms are folded over the head to rest on horizontal bar.
- The mid-axillary line is coincident with the middle of image receptor which is then adjusted to include the apices and the lower lobes to the level of the first lumbar vertebrae.

Direction and centring of x_ray beam:

- Direct the horizontal central ray at right angles to the middle of image receptor at the mid axillary line.

Radiological consideration:

- The image should include the apices and costophrenic angles and lung margins anteriorly and posteriorly.
- Image processing should be visualized.
- The projection is useful to confirm position and size of lesion suspected on the initial projection.
- It is not routine examination because of the additional patient dose and increasing use of computed tomography to examine the thorax.

Qus:3

1.Cervical spine _anterior _posterior C1 -C2:

Position of patient and image receptor:

- The patient lies supine on the buky table, if erect positioning is preferred, sits or stands with the posterior aspect of the hand and shoulders against the vertical Bucky.
- Median sagittal plane is adjacent to coincide with midline of image receptor such that at right angle.
- The neck is extended if possible such that line joining the tip of the mastoid process and inferior border of the upper incisors is at right angle to image receptor.
- This will superimpose the upper incisors and occipital bone and thus allowing clear visualized the area of interest.
- Image receptor is centred at level of the mastoid process.

Direction and centring of x-ray beam:

- Direct the perpendicular central ray along the midline to the centre of the open mouth.
- If patient is unable to flex the neck and attain the position described above then beam must be angled.
- Typically 5 to 10 degree cranially or caudally to superimpose the upper incisors on the occipital bone.
- Image receptor position may have to be altered slightly to allow the image to be centred after beam angulation.

Essential image characteristics:

- Inferior border of the upper central incisors should be superimpose over occipital bone.
- The whole of the articulation between the atlas and axis must be demonstrated.
- Ideally the whole of dens, the lateral masses of atlas and as much of axis as possible should be included within the image.

2.cervical spine _Lateral Erect:

Position of patient and image receptor:

- The patient stands or sits with either shoulder against the image receptor.
- The median sagittal plane should be adjusted with parallel to image receptor.
- Head should be flexed or extend such that angle of the mandible is not superimpose over the upper anterior cervical vertebrae or the occipital bone does not obscures the posterior arch of the atlas.
- Immobilization, the patient should stand with feet apart and with the shoulder resting against the image receptor stand.
- In order to demonstrate lower cervical vertebrae shoulder should be depressed.
- This can achieve by asking the patient to relax their shoulders downward.
- The process can be aided by asking patient to hold weight in each hand and making the exposure on arrested expiration.

Direction and centring x-ray beam:

- The horizontal central ray is centred to a point vertically below the mastoid process at level of the prominence of the thyroid cartilage.
- An FRD of 150cm should be used to reduce magnification.

Essential image characteristics:

- The whole of the cervical spine and upper part of TVI should be included.
- Mandible or occipital bone should not obscures any part of the upper vertebra.

- Angles of mandible and lateral portions of the floor of the posterior cranial fossa should be superimposed.
- Soft tissue of the neck must be included.

Qus:4

1. HAND:-

Basic projections for hand are;

- Posterior-Anterior dorsi-palmar.
- Anterior oblique dorsi-palmar oblique.
- Posterior-anterior both hand.
- Posterior oblique both hand.
- Lateral.

Others hand series;

- PA view
- AP view
- Lateral view
- Ball_catcher view

2. FOOT:-

Basic projections for hand are;

- Dorsi_planter.
- Dorsi_planter oblique
- Lateral
- Lateral erect
- Dorsi_planter erect.

Others;

- Ap view
- Oblique view
- Lateral view
- Weight bearing view.

3. Abdomen:-

Basic projections for abdomen are;

- Antero_posterior supine.
- Antero_posterior erect.
- Antero_posterior erect in sitting.
- Antero_posterior left lateral decubitus.

Others abdominal series;

- Acute abdominal series
- AP supine view
- PA erect view
- Lateral decubitus view
- Dorsal decubitus view
- PA prone view
- Lateral view
- Oblique view

